

## Automated System of Accounting Operations in the Car Depot Warehouse

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### Annotation

*The Republic of Uzbekistan has solved a number of strategic issues during the period of independence: construction of new local railway lines bypassing neighboring states; organization of high-speed passenger traffic; transition to modern communication means providing high-speed information exchange between linear, regional and road management levels, etc.*

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New lines have been built connecting south with north, east with west:

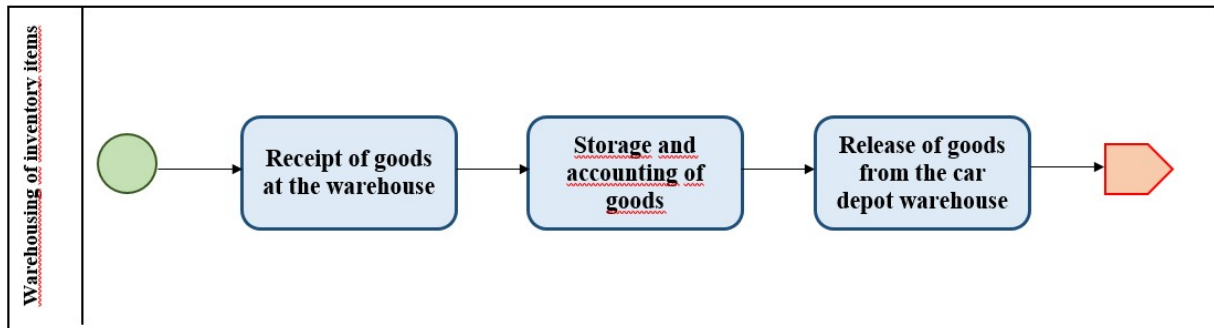
- Navoi-Uchkuduk-Sultan uwais-Nukus;
- Tashguzar-Baysun-Kumkurgan;
- Angren-Pop.

The operation of these lines has achieved the economic independence of the republic in terms of rail transportation, increased car traffic, including increased passenger traffic. Accordingly, the increase in passenger traffic caused a general load on the car depot and in particular on its warehouses.

The following types of work are carried out in the ICP-2 car depot of the passenger service of "Uztemiryulovchi" JSC with cars received from the flight: preparation of trains and individual cars for the flight; equipment, technical inspection, maintenance of cars assigned to the depot, recharging of batteries; current non-chain repair, inspection of axle boxes and auto brakes; checking of serviceable condition, safety equipment and inventory of passenger cars. Accordingly, the car depot warehouse plays an important role in the logistics chain for performing repair and equipment works (RER) with mobile units. The process of conducting accounting operations of inventory items (inventory items) in the warehouses of the car depot is conducted manually. The collection and subsequent data entry by manual method does not provide sufficient reliability of inventory accounting in the warehouse, since accounting information about goods often turns out to be unreliable. The introduction of v for the accounting of goods and materials in a car depot warehouse will not require expensive equipment or software, but will allow monitoring of goods, timely purchase of the required quantity, and inventory formation. The availability of the necessary goods and materials and their stocks will allow timely implementation of RER with mobile units, which will

ultimately have a positive impact on the profit received. Accordingly, the work on automating the accounting of goods and materials in the warehouses of the ICP-2 wagon depot is very relevant.

The process of receipt of goods and materials to the warehouse of the wagon depot can be represented by the following scheme (Fig.1).



*Fig.1. Scheme of receipt of goods, warehousing and release of goods from the warehouse of the wagon depot.*

The existing system of accounting operations of the goods and materials center of the ICP-2 wagon depot allows manual processing of incoming goods to the warehouse. At the same time, a lot of routine operations are performed, as well as inaccuracies, errors in accounting and reporting on goods are allowed. We propose to create an automated information system that will allow reading information from barcodes of goods and subsequent entry into the database (DB). Reading information about incoming goods and materials to the car depot warehouse will be performed by reading information from the barcode of the product and automatically generate data in the accounting system (if there is a barcode on the product).

### The main part

Automation of accounting operations with incoming goods and materials to the warehouse is carried out by using technical means, in the following ways:

- by scanning the barcode of the goods upon receipt, selection and release to the employees of the workshops of the car depot;
- using data collection terminals during inventory operations;
- Due to its own labeling of goods and materials, which are formed by label printers.

The information from the product label is read by a barcode scanner, which is then transmitted to the accounting system. The accounting system initially generates information about the goods and materials when it arrives at the warehouse, which is used in the selection and release of goods.

The data collection terminal (TSD) provides fast collection, processing and transmission of information about the goods during inventory, and can also be used when goods are received and selected for delivery to an employee of the depot shop. The terminal allows you to scan the entire product in a row, as well as to read the barcode of a separate item and manually enter the quantity of this product; accumulates information about scanned barcodes of goods in its memory.

The automated accounting system of the car depot warehouse, which uses a label printing printer, ensures that the barcode image is applied to the label. Labels with barcodes are printed only on goods arriving without a barcode.

The labels used for printing are specialized paper for marking the product, with the possibility of applying graphic information, and not only a barcode, and can be of different sizes and made of different materials. Materials for labels can be of two types: thermal transfer labels; thermal labels, printing on which is carried out by direct heating of sample points.

Automation of accounting operations in the warehouse is characterized by three processes:

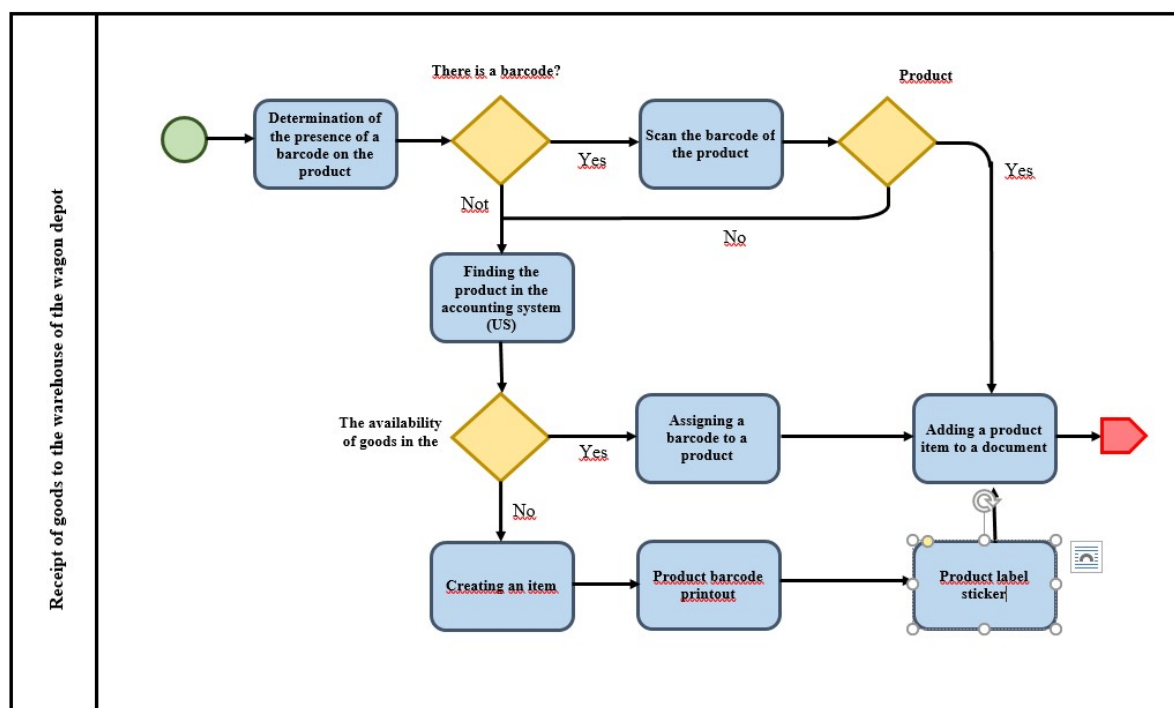
- receipt of goods, consisting of the following operations: accounting for surpluses, receipt of goods from the supplier;
- storage and accounting of goods, which includes inventory of goods and materials, movement of goods between warehouses;
- Release of goods — includes various operations of spending goods: write-off for internal needs, write-off of damage to goods, release of goods to a shop worker.

Let's look at each of these processes using the example of specific operations.

Receipt of goods to the warehouse

Operations for receiving goods from the supplier (Fig.2):

- forming an order to the supplier, which specifies the desired product;
- shipment of the goods by the supplier (at pickup) or delivery of the goods by the manufacturer;
- Reading barcodes of goods one by one by a scanner, and entering them into the database and into the Receipt of goods document.



**Fig.2. the scheme of receipt of goods to the warehouse of the wagon depot**

When goods and materials arrive at the warehouse without a barcode, entering information about goods into an automated system can be done by pre-prepared labels or by printing them out during the receipt of goods, labeling the goods and then entering the goods into the warehouse by scanning; entering the goods by quantity, without going through a scanner, when warehouse employees themselves count the goods and enter manually enter the data into the accounting system. After carrying out the document of receipt of the goods, the warehouse employees themselves barcode the goods: print labels with a barcode and glue them on the goods.

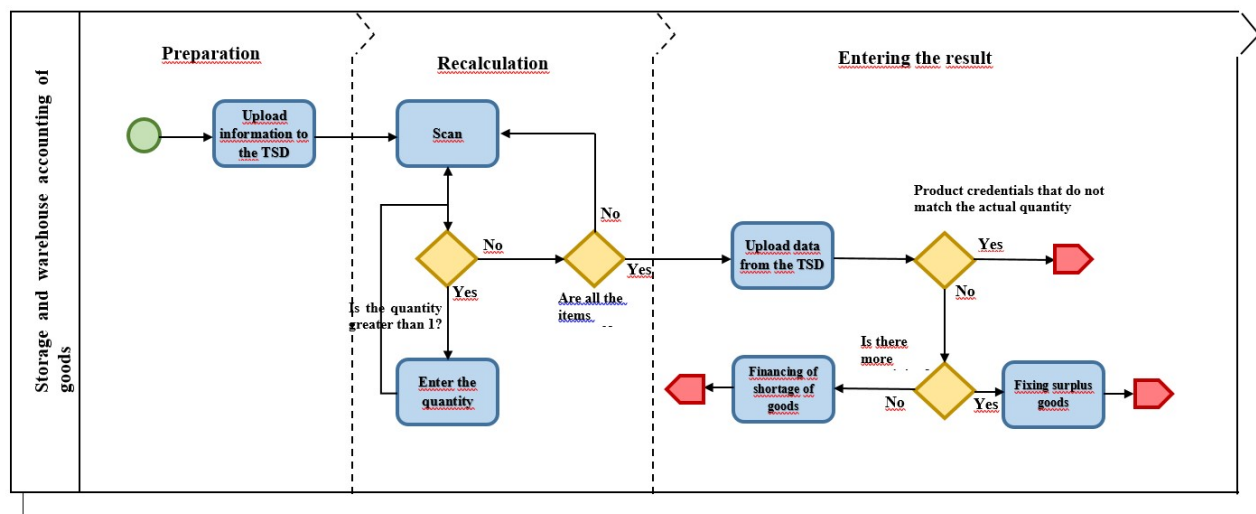
Therefore, to register the goods from the supplier or any other registration, a scanner and a barcode label printer are needed. As noted above, the receipt of goods can be done by a data collection terminal: we read

all the barcodes by the terminal, and then we upload all the information at the same time or in parts to the document of receipt of goods in the accounting system.

Having accepted the goods and materials, it is necessary to properly carry out storage, control, keep records of it, carry out inventory and, if necessary, arrange for the movement of goods.

#### Storage and accounting of goods in a car depot warehouse

During the storage and accounting of goods and materials, logistics operations taking place in the warehouse involve inventory and the movement of goods between the warehouses of the car depot. The movement of goods between depots is carried out by reading barcodes using the document “Movement”, which is the simultaneous delivery of goods from one source warehouse and receipt to the receiving warehouse, which is carried out by opening it and scanning the necessary goods into it (Fig.3).



**Fig.3. the scheme of storage and accounting of goods in the warehouse of the wagon depot.**

Inventory is the verification of the availability of goods on a certain date by comparing the actual data with the data of the accounting system. When conducting an inventory, an employee or several employees (if several employees — the warehouse is divided into sections) read the goods on the shelves one by one, using the TSD. Each employee goes and scans the product that he comes across in his section and subsequently this data is uploaded to the accounting system.

Information from the TSD comes in the form of a document “Inventory of goods” or “Recalculation of goods” with information about which goods were scanned during this work. Then you need to delete the data from the terminal, after which you can scan the next portion of data until the entire product is scanned.

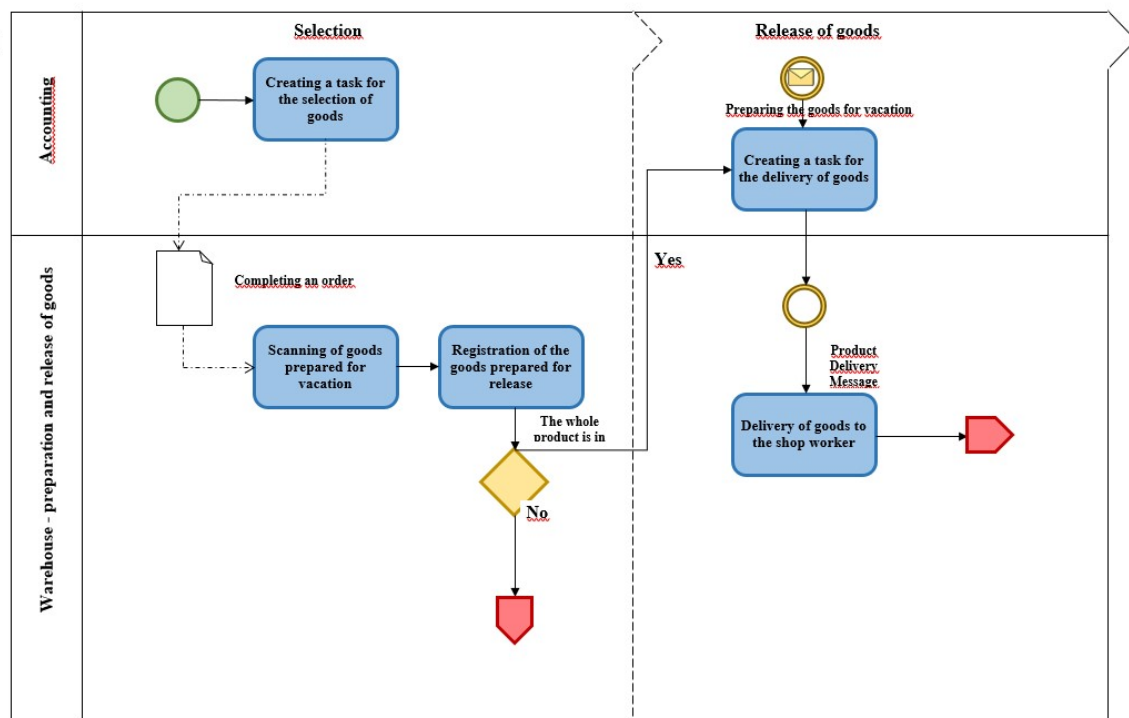
At the next stage, the system compares the results of the Inventory document with the accounting data and provides information about surpluses and shortages. In order to obtain accurate information about the remaining goods in warehouses, according to the results of the inventory is performed: write-off of shortage; recording of surpluses.

Based on the inventory data, if deficiencies are identified, then the difference between the write-off and the entry of the person financially responsible for the warehouse is responsible for the legislation of the republic.

Inventory is characterized by the following actions: scanning of goods; recording of scanned information in the Inventory document; comparing accounting data with actual ones, and issuing information about the need to create documents for “Writing off” and/or “Registering goods”.

#### Release of goods from the car depot warehouse

It is performed according to the following procedure: an employee of the accounting department for the release of goods and materials makes an order received from a depot employee; warehouse workers collect and release the goods according to the requirements (Fig.4).



Активаци:

**Fig.4. the process of releasing goods from the warehouse of the wagon depot**

The product assembly document consists of information about what needs to be collected and how much has already been collected. The warehouse worker collects the goods, scans it, if the goods are scanned, the data in the column of the collected goods increases.

When scanning a larger number of goods than specified in the requirement, in this case, the system issues a list of unnecessary items; scanning a smaller number of goods does not allow you to close the work on the order until all the goods are assembled. The collected goods corresponding to the ordered, allows you to give out to the workers of the workshops of the depot of goods and materials for the subsequent implementation of the RER. The design of the assembly of the goods can be performed not only with the help of a scanner, but also with the help of a TSD. At the same time, all the assembled goods are scanned at the same time, and the data is uploaded to the "Product Assembly" document.

## Conclusion

1. The use of barcoding will automate the entire process of movement of goods in the warehouse of the car depot.
2. Conditions are being created for the information provision of the employees of the warehouses of the car depot, the management of the passenger service with adequate data on the material values necessary for carrying out repair and equipment work.
3. Barcoding in the inventory of goods in the warehouse will help to avoid many errors related to the human factor, reduce the time for carrying out many routine warehouse operations.
4. Acceptance of goods and materials to the warehouse – barcode data is immediately included in the warehouse accounting program, manual labor is not required, the possibility of errors is excluded.
5. Inventory – if there is a large number of the same type of products in the warehouse, the introduction of barcodes will simplify control and data on goods and materials are simply entered into the program.
6. Release of goods and materials – information from the scanner is transmitted automatically to create invoices and expense orders, which will reduce the time for their execution.



## Literature

1. Karpova N.P. Methodology of strategic planning in marketing and logistics // Audit and financial analysis. M., - 2013. — No. 2. — pp. 255-258.
2. T.R. Nurmukhamedov, Zh.N. Gulyamov, Sh.T. Shakhidaeva. Modeling of a railway warehouse commodity and material values accounting (on the example of a train depot). AIP Conference Proceedings, 2021.
3. T.R. Nurmukhamedov, J.N. Gulyamov. Automated Warehouse Management Wagon Depot. Turkish Journal of Computer and Mathematics, 2021. <https://www.turcomat.org/index.php/turkbilmat/article/view/1790>.

